



# Recent Developments in NASA Human-Rating Requirements

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## Recent Developments

- Administrative change to NPR 8705.2B
- Safety goal and threshold for ISS crew transport
- Commercial Crew Transportation

## Update: NPR 8705.2B w/ change 2 (1/3)



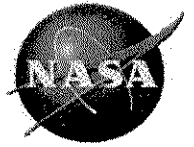
- Safety goal policy added to the Human-Rating NPR:
  - Administrator sets Agency-level safety thresholds/goals
  - Programs required to maintain continuous safety upgrade and improvement program
  - Programs to meet probabilistic criteria with high degree of certainty
- Element of certification package at milestone reviews
  - HRCF endorsement is input to Key Decision Points

## Update: NPR 8705.2B w/ change 2 (2/3)



- NPR now cites NASA-STD-3001
- NASA-STD-3000 replaced by new documents
  - NASA-STD-3001 volumes 1 and 2
  - Human Integration Design Handbook (SP-2010-3407)
- The standards maintain the high level functional requirements, as well as mandatory thresholds for health, safety, and crew performance
- Updated and expanded NASA-STD-3000 data

## Update: NPR 8705.2B w/ change 2 (3/3)



- Restructuring of process requirements on analysis and reporting
- Removal of term “integrated design and safety analysis”
- New requirement to evaluate the effectiveness of crew survival capabilities
- Clarification of failure tolerance requirement



# ISS Crew Transport Risk Tolerance

- Administrator signed Agency-level requirements
  - Safety threshold and goals
  - Continuous safety upgrade and improvement program
- Design threshold (compared to Shuttle at end of life):
  - At least as safe for combined ascent and entry phases
  - Overall, at least as safe as Space Shuttle 12-day mission
  - With high degree of assurance
- Ultimate goal (compared to Shuttle at end of life):
  - Order of magnitude safer for ascent and entry
  - Overall, substantially safer than Space Shuttle mission

# Evaluation of Safety Thresholds



- Agency has defined corresponding probabilistic criteria
- Satisfaction of criteria evaluated via probabilistic safety analyses
  - Similar to analyses used by Shuttle, ISS, Constellation
  - Must consider uncertainty associated with estimates
  - As integral part of safety oversight and insight
- Applicable to NASA developments and commercial acquisitions

# Commercial Crew Transportation



- Acquisition model still being evaluated
  - Currently, fixed price contract(s) for next development phase are anticipated
- Commercial Crew Program released initial draft of certification requirements and insight/oversight plan
  - Currently being updated based on industry feedback and guidance regarding acquisition models
  - Design, process standards must be met or exceeded
  - Planned safety evaluations include probabilistic assessments and hazard control evaluations